



PASIG PERFORMING ARTS

SPECIAL INTEREST GROUP



ORTHOPAEDIC SECTION
AMERICAN PHYSICAL THERAPY ASSOCIATION



American Physical Therapy Association
The Science of Healing. The Art of Caring.

PASIG MONTHLY CITATION BLAST: No.51

June 2010

Dear PASIG members:

CSM abstract and programming submission is now closed and reviewers are at work evaluating them. Acceptances should go out in September. In the meantime, PASIG Vice President, Lisa Shoaf, has been hard at work planning our PASIG programming at the next Combined Sections Meeting will be held in New Orleans, February 9 –12, 2011.

Don't forget, the PASIG sponsors an annual student research scholarship. This award is to recognize students, who have had an abstract accepted to CSM, for their contribution to performing arts medicine and research. For more information on the research award please check our webpage (www.orthopt.org/sig_pa.php). Students with additional questions can contact Amy Humphrey (ahumphrey@bodydynamicsinc.com).

Performing Arts continuing education, courses, and related conferences:

Orthopaedic Section Independent Study Course. *Dance Medicine: Strategies for the Prevention and Care of Injuries to Dancers*. This is a 6-monograph course and includes many PASIG members as authors. This home study course can be purchased at <http://www.orthopt.org/independent2.php>.

Principles of Dance Medicine: Clinical Management of the Dancer Patient
July 15 – 18, 2010
New York, NY
Email: harkness@nyumc.org Web: www.danceinjury.org

Performing Arts Medicine Association (PAMA)
28th Annual Symposium on Medical Problems of Musicians and Dancers
July 29 – Aug 1, 2010
Snowmass, CO
Contact: <http://www.artsmed.org/>

****NEW PASIG monograph in development. Topics include figure skating, gymnastics and instrumental musicians. Be on the lookout for its release in Fall 2010.****

International Association for Dance Medicine and Science (IADMS) 20th Annual Meeting

October 28 – 31, 2010

October 31: Biomechanics and Dance Workshop

Birmingham, UK

Contact: www.iadms.org

If you know of other courses of interest to our membership, please send the information to: Amy Humphrey PT, DPT, OCS, MTC; ahumphrey@Bodydynamicsinc.com

Thank you to those members who have updated their membership profile. You can now be found easier by your colleagues and we have received good feedback from you. **For those members who have not yet updated your membership profile, it only takes a few minutes, so please use the link below** (must log in):

https://www.orthopt.org/surveys/membership_directory.php"

Did you know that the Orthopaedic Section has a Facebook site? Check it out and become a friend. You'll find a link on the Orthopaedic Section website:

<http://www.orthopt.org/>

For this June Citation BLAST, I've selected the topic *Cuboid Subluxation*. The general format is an annotated bibliography of articles from 2000 – 2010. The PASIG Research Committee initiated this monthly Citation BLAST on performing arts-related topics in June 2005 in the hopes of encouraging our members to stay current in the literature and, perhaps, consider conducting research themselves. Each month we send a new list of performing arts (PA) citations to members of the PASIG to further the pursuit of PA-related scholarship. The BLASTS and updated libraries are posted on the PASIG webpage for our members to access and download. (Information about EndNote referencing software can be found at <http://www.endnote.com>, including a 30-day free trial).

I also have a request for PASIG volunteers working on PA-related terminology papers: *please send me an update on your work!* Hopefully some of these will be completed by fall and available to our members as a BLAST or on our webpage.

Upcoming citation topics will include Pilates, Taping, Yoga, nutrition, and eating disorders. Anyone interested in contributing to one of these topics or to suggest a new special topic, please contact me. As always, your comments, suggestions, and entry contributions to these Citation BLASTs are welcome. Please drop me an e-mail anytime.

Regards,
Shaw

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Cuboid Subluxation

Cuboid subluxation usually involves plantar displacement of the cuboid, resulting in pain with push off (plantar flexion) during walking, dancing, or running. It may be an isolated injury or result from a plantar flexion/ inversion ankle injury. Fractures of the cuboid are rare.

Unfortunately, diagnosis of cuboid subluxation may go unrecognized as it is not that common in athletes who participate in sports with protective footwear. Treatment of cuboid subluxation is relatively simple, responding to a cuboid manipulation called the cuboid “whip.” Post reduction taping is helpful in individuals with greater laxity.

As cuboid injury is infrequently cited in the literature, I’ve expanded the inclusion years of this search.

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Adams E, Madden C (2009). Cuboid subluxation: a case study and review of the literature. Curr Sports Med Rep 8(6): 300-307.

Cuboid subluxation involves displacement of the cuboid, resulting in pain and problems with push off during dancing or running. Its incidence varies with the population being studied, being apparently highest in ballet dancers. Most cuboid subluxations are plantar and medial, with rare dorsal subluxations. Diagnosis rests on adequate clinical evaluation, and traditional imaging tends to be unhelpful. Ultrasound imaging may offer some insights, although much remains to be learned about this imaging modality in cuboid subluxation. Treatment focuses on conservative measures, including cuboid manipulation, bracing and taping, activity modification, and orthotics. Immobilization may be warranted in cases in which instability is noted, such as after acute traumatic injury. Most athletes and dancers with this disorder return to full participation after successful treatment. Adequate awareness and understanding of this condition will lead to improved diagnosis and outcomes.

Adams SB, Simpson AW, et al. (2009). Calcaneocuboid joint subluxation after calcaneal lengthening for planovalgus foot deformity in children with cerebral palsy. J Pediatr Orthop 29(2): 170-174.

BACKGROUND: Calcaneal lengthening is a common procedure for the treatment of symptomatic planovalgus deformity in children with cerebral palsy. Stabilization of the calcaneocuboid joint to prevent subluxation at the time of lengthening has been described. The purpose of this study was to evaluate the magnitude of calcaneocuboid joint subluxation and associated degenerative changes in patients with cerebral palsy who underwent calcaneal lengthening for planovalgus foot deformity with and without stabilization of the calcaneocuboid joint. METHODS: We conducted a retrospective review of children with cerebral palsy who underwent lateral column lengthening through the calcaneus. For the purposes of statistical analysis, the feet were divided into 2 groups: stabilized (those that

received Steinmann pin stabilization at the time of lengthening) and nonstabilized (those feet that did not receive Steinmann pin stabilization). Initial, intraoperative, and most recent follow-up radiographs were reviewed for segmental foot analysis of planovalgus deformity, calcaneocuboid joint subluxation, and osteoarthritic changes. A minimum of 3-year follow-up was required. RESULTS: Sixty-one feet were included in this study; 28 feet in the stabilized group and 33 in the nonstabilized group. Radiographic assessment of segmental foot analysis demonstrated significant improvement with regard to planovalgus deformity ($P < 0.05$, 5 measurements). Calcaneocuboid joint subluxation occurred in 24 feet in the stabilized group and 29 feet in the nonstabilized group ($P = 0.5269$). At final follow-up, the magnitude of subluxation was not significantly different between the groups ($P = 0.076$). There was no difference in the incidence of osteoarthritic changes at the calcaneocuboid joint between the groups ($P = 0.2856$). CONCLUSIONS: Lateral column lengthening through the calcaneus, for planovalgus foot deformity, significantly improved the segmental alignment of the foot with respect to radiographic assessment. Stabilization of the calcaneocuboid joint at the time of lateral column lengthening through the calcaneus did not significantly reduce the incidence or magnitude of subluxation when compared with nonstabilized lengthening. In addition, stabilization did not have an effect on the development of radiographic osteoarthritic changes at the calcaneocuboid joint. LEVEL OF EVIDENCE: Level III, retrospective comparative study.

Blakeslee TJ, Morris JL (1987). Cuboid syndrome and the significance of midtarsal joint stability. J Am Podiatr Med Assoc **77**(12): 638-642.

Bush JB, Treuting RJ (2005). Cuboid dislocation associated with a central column Lisfranc injury: a case report. Foot Ankle Int **26**(11): 990-993.

Dodson NB, Dodson EE, et al. (2008). Imaging strategies for diagnosing calcaneal and cuboid stress fractures. Clin Podiatr Med Surg **25**(2): 183-201.

Stress fractures of the calcaneus and cuboid bones are not among the most common pathologies seen by the foot and ankle specialist on a day-to-day basis. Therefore, the clinician must be suspicious of these particular entities when conservative therapy has failed to alleviate the pain of a more common condition. The purpose of this article is to discuss the signs, symptoms, MRI findings, nuclear imaging characteristics, and radiographic features associated with calcaneal and cuboid stress fractures. Case studies of both conditions are also discussed within this article.

Ebraheim, NA, Biyani A, et al. (1996). Calcaneocuboid joint involvement in calcaneal fractures. Foot Ankle Int **17**(9): 563-565.

The charts and radiographs of 48 surgically treated patients who underwent surgery for calcaneal fractures (right in 25 patients, left in 22, and bilateral in 1) between 1987 and 1994 were retrospectively reviewed. Coronal computed tomographic scans alone were obtained in 33 patients, and both coronal and axial computed tomographic scans were obtained in 9 patients. Three fractures exiting close to the calcaneocuboid joint (CCJ), but not involving the joint, were excluded. Nineteen patients (38.7%) had involvement of the CCJ. The extension of the fracture to the CCJ was apparent in anteroposterior or oblique radiographs or both in 18 patients. There was intra-articular fracture displacement of $< \text{or} = 1$ mm in 6 patients, and 13 patients had a step or a gap of $> \text{or} = 2$ mm with or without angulation. Eleven patients had joint depression type fractures, 6 had tongue type fractures, and 2 had comminuted fractures. Extension of the calcaneal fracture into the CCJ was significantly more common with the joint depression type calcaneal fractures (chi-square test; $P = 0.008$). The coronal computed tomographic images showed significant lateral subluxation of posterior facet fragments in 8 patients and considerable comminution of the lateral calcaneal wall with or without lateral subluxation of posterior facet fragment in 10 patients. These

patients also had CCJ involvement, thus establishing a strong correlation between lateral subluxation of the posterior facet fragment or comminution of the lateral calcaneal wall and CCJ involvement. CCJ involvement is more common with joint depression type fractures. Extension of the fracture line into the CCJ should be suspected in presence of significant lateral column comminution or lateral talar subluxation.

Everson, L. I., H. R. Galloway, et al. (1991). Radiologic case study. Cuboid subluxation. Orthopedics **14**(9): 1037, 1044, 1046-1038.

Fallat L, Grimm DJ, et al. (1998). Sprained ankle syndrome: prevalence and analysis of 639 acute injuries. J Foot Ankle Surg **37**(4): 280-285.

The ankle sprain is often thought of as an injury involving only the lateral ankle ligaments. Frequently other structures are also injured. However, the literature describes only some of the associated injuries. The authors feel that a thorough analysis of each structure injured with the inversion and eversion ankle sprain along with the incidence would be invaluable in making an accurate diagnosis and providing appropriate treatment. The authors conducted a prospective study using a standardized evaluation during the initial examination of patients reporting with an ankle sprain. Over a 33-month period, 639 patients were studied at Oakwood Hospital Downriver Center Emergency Room and Occupational Medicine Clinic. Of the 639 patients, 92 had an associated avulsion or compression fracture of the foot or ankle. Of the remaining 547 patients, the anterior talofibular ligament was injured 453 times, the calcaneal fibular ligament was injured 366 times, and the posterior talofibular ligament was injured 187 times. Injuries to the ankle joint capsule were noted in 180 cases, the extensor digitorum brevis was involved in 111 cases, the sinus tarsi was involved in 88 cases, the peroneal tendons in 83 cases, the Achilles tendon in 67 cases, the calcaneal-cuboid ligament in 41 cases, and the syndesmosis was injured in 31 cases. Additionally, neuritis was seen in 80 patients presenting with a sprained ankle. Because of the varied and multiple components to the common sprained ankle, the authors feel that this condition would more appropriately be designated as the sprained ankle syndrome. The findings of this study may aid the examiner in exploring a more knowledgeable approach in evaluation, leading to an accurate diagnosis and appropriate treatment.

Gallino RM, Gray AC, et al. (2009). The outcome of displaced intra-articular calcaneal fractures that involve the calcaneocuboid joint. Injury **40**(2): 146-149.

INTRODUCTION: The outcome of displaced intra-articular fractures of the calcaneus is affected by many factors such as fracture type and age. The restoration and maintenance of the posterior facet is a priority and has a strong correlation with improved outcome. The fracture occasionally extends anteriorly to the calcaneocuboid joint (CCJ). Currently there is little literature discussing pain, functional or radiographic information about calcaneal fractures, which involve the CCJ or those that do not. The aim of this study was to compare pain and functional outcome measurements in a cohort of calcaneal fractures treated operatively and non-operatively to determine whether CCJ involvement was important. **PATIENTS AND METHODS:** A prospective database of calcaneal fractures managed by a single surgeon was reviewed. CT images allowed us to assess the degree of CCJ involvement before and after surgery. Final outcome was determined by pain (validated visual analogue score) and functional outcomes (SF-36) taken 2 years after injury with further CT imaging used to determine the presence of arthritic change at the CCJ. 59 patients with 64 intra-articular calcaneal fractures were identified who also had 35 fractures that extended to the CCJ. Pre-operative CT imaging identified 3 levels of CCJ involvement: Undisplaced fracture line (n=27); fractures that involved <50% of the CCJ (n=4) and fractures that involved >50% of the CCJ with joint subluxation (n=4). **RESULTS:** Pain and functional scores were comparable between fractures that involved the CCJ and those that did not. All fractures that involved >50% of the CCJ demonstrated arthritic change 2-years

after injury. DISCUSSION: Displaced intra-articular fractures of the calcaneus will often have a fracture line extending into the CCJ. This is commonly undisplaced and does not appear to predict continued pain, dysfunction on radiographic appearance using generalised outcome measurements.

Hardaker WT, Margello S, et al. (1985). Foot and ankle injuries in theatrical dancers. Foot Ankle **6**(2): 59-69.

The theatrical dancer is a unique combination of athlete and artist. The physical demands of dance class, rehearsal, and performance can lead to injury, particularly to the foot and ankle. Ankle sprains are the most common acute injury. Chronic injuries predominate and relate primarily to the repeated impact loading of the foot and ankle on the dance floor. Contributing factors include anatomic variation, improper technique, and fatigue. Early and aggressive conservative management is usually successful and surgery is rarely indicated. Orthotics play a limited but potentially useful role in treatment. Following treatment, a structured rehabilitation program is fundamental to the successful return to dance.

Holbein O, Bauer G, et al. (1998). [Dislocated cuboid fracture. Clinical aspects and therapy of a rare foot injury]. Unfallchirurg **101**(3): 214-221.

Fractures of the cuboid are very rare. During the last 10 years four patients with isolated fractures of the cuboid have been treated in our hospital. The displaced fractures were treated by open reduction, bone grafting where necessary, and internal fixation. At the time of follow-up the results concerning pain and function were good to excellent and better than those previously reported for conservative treatment. We recommend this treatment for fractures with displacement of one or more of the articular surfaces or with shortening of the lateral arch of the foot.

Jennings J, Davies GJ (2005). Treatment of cuboid syndrome secondary to lateral ankle sprains: a case series. J Orthop Sports Phys Ther **35**(7): 409-415.

STUDY DESIGN: Case series. BACKGROUND: Plantar flexion/inversion ankle sprains are one of the most frequently occurring sports injuries. Cuboid syndrome, which is difficult to diagnose, may result from a plantar flexion/ inversion ankle injury and could become the source of lateral ankle/midfoot pain. The objective of this case series is to describe the examination, evaluation, and treatment of the cuboid syndrome following a lateral ankle sprain. CASE DESCRIPTION: Seven patients were seen in our clinic 1 to 8 weeks following a lateral ankle sprain with a chief complaint of lateral ankle/midfoot pain. In these 7 patients, the presence of cuboid syndrome was identified independently by 2 examiners. Treatment consisted of a cuboid manipulation. OUTCOMES: All 7 patients returned to sports activities following 1 to 2 treatments consisting of the "cuboid whip" manipulation. No recurrence of symptoms was reported upon immediate return to competition or during the remainder of the season (mean follow-up, 5.7 months; range, 2 to 8 months). DISCUSSION: Based on those 7 patients, our results suggest that patients who are properly diagnosed with cuboid syndrome and receive the cuboid manipulation can return to competitive activity within 1 or 2 visits without injury recurrence.

Kannan A, Kumar A, et al. (2010). Transverse tarsal and tarsometatarsal cuboid subluxation: a case report. Foot Ankle Int **31**(5): 452-454.

Kolker D, Marti CB, et al. (2002). Pericuboid fracture-dislocation with cuboid subluxation. Foot Ankle Int **23**(2): 163-167.

The case of a 44-year-old male with a traumatic pericuboid fracture-dislocation consisting of disruption of the midtarsal, tarsometatarsal and pericuboid articulations is presented. The cuboid was partially dislocated without cuboid fracture. Treatment consisted of open

reduction with stable internal fixation followed by early range of motion and protected weight-bearing for 12 weeks. Functional outcome results were excellent at final follow-up.

Leerar PJ (2001). Differential diagnosis of tarsal coalition versus cuboid syndrome in an adolescent athlete. J Orthop Sports Phys Ther **31**(12): 702-707.

Marshall P, Hamilton WG (1992). Cuboid subluxation in ballet dancers. Am J Sports Med **20**(2): 169-175.

Cuboid subluxation is a common but poorly recognized condition. Its symptoms include lateral midfoot pain and an inability to "work through the foot." In addition, pressing on the plantar surface of the cuboid in a dorsal direction produces pain. The normal dorsal/plantar joint play is reduced or absent when compared to the uninjured side, and subtle forefoot valgus is present. Frequently, there is a shallow depression on the dorsal surface of the foot and palpable fullness on the plantar aspect of the cuboid. Documentation by radiograph, CT scan, or magnetic resonance imaging is difficult because of the normal variations found in the relationship between the cuboid and its surrounding structures. The diagnosis is primarily subjective, and must be made on the basis of the patient's history and physical findings. Treatment requires recognition of the condition, manual reduction by a therapist or physician familiar with the condition, and follow-up to be certain that the cuboid remains in place. Therapists and orthopaedists involved in the care of dancers should be alert to the possibility of cuboid subluxation and be able to recognize it when it occurs.

Miller TT, Pavlov H, et al. (2002). Isolated injury of the cuboid bone. Emerg Radiol **9**(5): 272-277.

The purpose of this study was to describe isolated injury of the cuboid bone as a potentially radiographically occult cause of foot pain. The imaging studies of 17 patients, 13 women and 4 men aged 17-79 years (average 45 years), who presented with pain over the lateral aspect of the midfoot were retrospectively reviewed. Frontal, lateral, and inversion-oblique radiographs were available for all patients. In addition, MR imaging was performed in eight patients, CT in two, conventional tomography in two, and bone scan in one. Conventional radiographs revealed cuboid fracture in seven patients. Of the remaining ten, eight underwent MR imaging which demonstrated four fractures, three bone bruises, and one stress reaction, and two had tomography, CT, and/or bone scan, all of which documented an isolated cuboid fracture. Isolated fracture of the cuboid may be radiographically occult. Other imaging modalities, particularly MR imaging, can document this injury as the source of pain.

Mooney M, Maffey-Ward L (1994). Cuboid plantar and dorsal subluxations: assessment and treatment. J Orthop Sports Phys Ther **20**(4): 220-226.

Plantar flexion and inversion stresses at the ankle may cause the tarsal cuboid to sublux in a plantar or dorsal direction resulting in pain and impaired joint function. Subluxation of the tarsal cuboid alters the passive physiological motion and accessory glides of the cuboid joints in characteristic patterns of motion restriction. Identification of the pattern of motion restriction is necessary for appropriate diagnosis and treatment. This paper presents the case reports of two patients with lateral foot pain. A subluxed cuboid bone was believed to be the cause of the patient's pain. Assessment and treatment are described and possible pathomechanics for cuboid subluxation are presented. Passive physiological motion of the cuboid and accessory joint glides should be assessed in patients complaining of lateral foot pain or with inversion ankle injuries. Pain and joint impairment can be alleviated with proper assessment and treatment.

Omey ML, Micheli LJ (1999). Foot and ankle problems in the young athlete. Med Sci Sports Exerc **31**(7 Suppl): S470-486.

In the U.S., greater than half of boys and one quarter of girls in the 8- to 16-yr-old age range are engaged in some type of competitive, scholastic, organized sport during the school year. Children and adolescents are becoming more involved in sports at earlier ages and with higher levels of intensity. Foot and ankle problems, in particular, are the second most common musculoskeletal problem facing primary care physicians in children under 10 yr of age next to acute injury. This report focuses on foot and ankle problems, trauma, and overuse in the young athletic population. Guidelines are given for both conservative and surgical management. Specific problems addressed include pes planus, tarsal coalition, adolescent bunion, os trigonum, accessory navicular, physeal fractures, sprains, peroneal tendon subluxation, metatarsal fractures, sesamoid fractures, turf toe, stress fractures, tendonitis, osteochondritis dissecans, ankle impingement, bursitis, Haglund's deformity, sesamoiditis, plantar fasciitis, apophysitis, osteochondroses, cuboid syndrome, and reflex sympathetic dystrophy. An extensive review of the literature is performed and presented in combination with the extensive experience of a well-established sports medicine clinic at the Boston Children's Hospital.

Siegel IM (1994). Recurrent dorsal subluxation of the fifth metatarsal-cuboid joint secondary to trauma. Orthop Rev **23**(7): 607-609.

A young woman presented with recurrent dorsal subluxation of the fifth metatarsal-cuboid joint secondary to trauma. The injury was treated by metatarsal-cuboid fusion without functional residual disability.

Subotnick SI (1989). Peroneal cuboid syndrome. J Am Podiatr Med Assoc **79**(8): 413-414.

Tindall AJ, Rajan DT (2003). Case report of a fractured cuboid following an inversion injury of the ankle. Foot (13): 3.

Cuboid fractures are often difficult to diagnose. We present a unique case, of a "reverse nutcracker fracture", where an inversion injury of the ankle caused a fracture of the cuboid, which was only apparent on a subsequent oblique radiograph.

Wainwright AM, Parmar HV, et al. (1993). Calcaneocuboid dislocation in a case of Ehlers-Danlos syndrome. Injury **24**(4): 274.

Williams DP, Hanoun A, et al. (2009). Talonavicular dislocation with associated cuboid fracture following low-energy trauma. Foot Ankle Surg **15**(3): 155-157.

Isolated talonavicular dislocations are uncommon injuries, usually occurring as a result of high-energy trauma. As a result extensive disruption of the midfoot ligamentous structures commonly occur with these injuries, often resulting in a poor outcome. Due to its rarity these injuries remain poorly understood, and several opinions exist on the probable mechanisms of injury and the optimal treatment. Five main injury types have been classified based on the deforming forces and direction of displacement; medial, lateral, longitudinal, plantar, and crush. However new mechanisms and injury patterns continue to be reported. We report a case of a medial swivel type talonavicular dislocation, associated with a cuboid body fracture, which is previously undescribed.